

We claim:

1. A method for manufacturing an achromatic quarter-wave films comprising the steps of:

5 (a) laminating a twisted nematic-liquid crystal (TN-LC) polymeric film between two uniaxial polymeric films as a sandwich to provide an optical component;

(b) providing a polarizer means to receive incident unpolarized light of a wide spectral bandwidth and convert said incident unpolarized light into  
10 linearly polarized light;

(c) organizing said TN-LC polymeric film and said two uniaxial polymeric films components of said optical component so that the linearly polarized light becomes circularly polarized after passing through the two uniaxial polymeric films and the TN-LC film;

15 (d) reflecting the circularly polarized light so that it passes back through the TN-LC film and the two uniaxial polymeric films one more time and finally becomes linearly polarized and orthogonal to the polarizer, and,

(e) blocking the outgoing linearly polarized light by the polarizer leading to a dark state whereby the lamination of the two films and the TN-LC film  
20 functions as a quarter-wave film.

2. A method for manufacturing an achromatic quarter-wave film according to Claim 1 wherein the LC film and the two uniaxial films have similar molecular structures.

3. A method for manufacturing an achromatic quarter-wave film according to  
5 Claim 2 wherein each of said films have a phenyl group.

4. A method for manufacturing an achromatic quarter-wave film according to Claim 2 wherein each of said films have a small variation of their parameters around their optimal values.

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5. An achromatic quarter-wave film comprising:

(a) a laminated twisted nematic-liquid crystal (TN-LC) polymeric film sandwiched between two uniaxial polymeric films to provide an optical component;

(b) a polarizer to receive incident unpolarized light of a wide spectral bandwidth and  
15 convert said incident unpolarized light into linearly polarized light; and,

(c) a reflector of the circularly polarized light emergent from the optical component so that it passes back through the optical component.

6. An achromatic quarter-wave film according to Claim 5 wherein the TN-LC film  
20 and the two uniaxial films have similar molecular structures.

7. An achromatic quarter-wave film according to Claim 5 wherein each of said films have a phenyl group.

8. An achromatic quarter-wave film according to Claim 5 wherein each of said  
5 films have a small variation of their parameters around their optimal values.